REVIEWS

Aspects of the Genesis and Maintenance of Biological Diversity. Edited by MICHAEL E. HOCHBERG, JEAN CLOBERT, and ROBERT BARBAULT. 1996. Oxford University Press, New York. ISBN 0-19-854884-2.

Aspects of the Genesis and Maintenance of Biological Diversity encapsulates 16 presentations from a series of six workshops held in Paris, France, in 1993. The introduction by Robert M. May provides a sobering reminder that only around 1.4 of the 3 to 8 million species on the planet (May's guestimate) have been named and recorded. Realizing that extinction rates in well-documented groups have run a thousand times faster than average background rates, May challenges readers to set priorities on what to save. The three sections of the book define the breath or works, spanning evolutionary biology, population and community ecology, and conservation.

The first two chapters in the first section, "Evolution: Patterns and Processes", begin with clever techniques to fill the gaps in paleontological records to accurately estimate the biodiversity of the past. A smaller group of readers might find Chapter 3 (New Computer Packages for Analyzing Phylogenetic Tree Structure) interesting. Chapter 4, by Nichols and Beaumont, reminds us that "genetic variation within species is one of the most valuable and yet neglected components of biological diversity". Using flies, humans, and grasshoppers as examples, the authors create an eye-opening view of spatial, temporal, and genetic variation. Interesting questions are raised about adaptive polymorphism in heterogeneous environments in Chapter 5, but the answers seemed dependent on future funding.

The second section of the book, "Ecology: From Populations to Communities to Ecosystems", begins with a compelling analogy to Noah's Ark and the urgent need for conservation despite little knowledge of the species we are supposed to save. We are challenged with the fundamental question of whether or not species are interchangeable within functional groups and whether selection favors species that persist with the smallest available nutrient pool. The strongest chapter, by Bryan Shorrocks, is about local diversity: a problem with too many solutions. Using *Drosophila* as a model species, Shorrocks cleverly untangles alpha and beta diversity from fruit stands to a European latitudinal gradient. He provides excellent examples of spatial and temporal diversity, resource selection, and niche and spatial heterogeneity. The book is worth purchasing for the chapter alone. The four following chapters on parasitoid interactions, food web assembly, and nutrient cycling pathways were interesting but less strongly linked to the book's title.

In the overview of the third section, "Large Scale Diversity Patterns and Conservation," Lawton et al. proclaim "It is a disgrace that we have only the haziest notion of the number, distribution, and survival of the species worldwide especially when the rapid growth of human population is the key factor", Chapter 11, by Turner et al., revisits theories from Wallace (1878) and Hutchinson (1959) on the latitudinal gradient of species diversity, only to suggest that the species energy theory has survived our attempts to destroy it. This is followed by the second strongest chapter in the book, by Gaston, on spatial covariance in the species richness of higher taxa. Gaston discusses endemism, rarity, sampling artifacts, issues of spatial scale, spatial autocorrelation, mechanisms, and interactions—all with remarkable clarity and supported with many references. The next three chapters on biodiversity of parasites, taxonomic relatedness, and genetic information seemed out of place in this section. The final chapter, by Thomas, on butterfly metapopulations, provides a strong example of the difficulties in conserving widely dispersed species.

In summary, the book is well written but probably would be more useful to sci-

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entists than non-scientists. The book would have benefited from an international discussion on how we can better quantify our planet's biodiversity. The occasional strong chapters make this fairly expensive book an intellectual bargain. However, it is painfully clear from May's challenge in the introduction that far more work is needed to gather and link local, regional, and global information on biodiversity in the face of our planet's sixth wave of extinction.

—THOMAS J. STOHLGREN, Biological Resources Division/USGS (Midcontinent Ecological Science Center) and Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO 80523-1499.

Molecular Genetic Approaches in Conservation. Edited by THOMAS B. SMITH and ROBERT K. WAYNE. 1996. Oxford University Press, New York. 483 pages. $70.00. ISBN 0-19-509526-X.

The first question a *Madroño* reader is likely to ask about this book is "how many of the 28 chapters are relevant to plant conservation?" The short answer: "disappointingly few." However, hidden in the zoocentric majority, a minority of chapters focus entirely on plants (three to be exact), and several contain material of broad general interest. Although in principle plant and animal conservation biology have much in common, an important distinction arises in molecular genetics: the suitability and availability of polymorphic markers. Most of the conservation genetic methods and case studies presented here exploit the rapidly evolving mitochondrial genome or hypervariable microsatellite markers of animals. These polymorphic and well-characterized markers are extremely informative in measuring diversity and reconstructing population history in animals. In contrast, the mitochondrial genome of plants is slowly evolving and relatively poorly characterized, and therefore difficult to exploit at the levels of interest to conservation biologists. Likewise microsatellite loci, which are already well-characterized in the nuclear genome of many animal species, have been slow to enter the toolbox of plant conservation geneticists. (Microsatellites possess many alleles at each locus and are therefore more powerful in population genetic analyses than dominantly inherited random amplified polymorphic DNA (RAPD), a popular method in plant studies.)

The opening chapter, "An Overview of the Issues", reviews the hierarchical levels (from individual to ecosystem!) at which molecular genetic tools have been applied in conservation biology. Foreshadowing the zoocentricity of subsequent chapters, no botanical examples are given. The next eighteen "methods" chapters cover a variety of techniques, but many of these are not readily transferable to plants due to their reliance on mitochondrial DNA or well-characterized nuclear loci. The chapter on RAPD markers in conservation genetics by Peter Fritsch and Loren Rieseberg is perhaps of the broadest applicability in the book. In fact, it contains the book's only reference to fungi. The well-characterized organellar genome of plants, chloroplast DNA (cpDNA), is the subject of two chapters. Although cpDNA can be effectively used to resolve species-level relationships, it is rarely variable enough to confidently resolve population phylogenies, as is routine for animal mitochondrial DNA. The cpDNA chapters cover traditional restriction site methods and DNA sequencing, respectively. Unfortunately, some of the more innovative applications of PCR to the chloroplast genome (e.g., single-strand conformational polymorphisms and chloroplast simple sequence repeats) are not included. These promising methods do have the potential to resolve population relationships, the hierarchical level of greatest interest in most conservation genetics studies.

The methods section is followed by three "analysis" chapters. They provide good introductions to the issues of estimating effective population size and migration, modeling genetic bottlenecks, and the problems associated with quantifying relatedness from molecular genetic data. All three are based primarily on data from mitochondrial